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Rev Paul Pediatr. 2014;**32(3)**:177–182.

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ORIGINAL ARTICLE

Profile of children and adolescents admitted to a Burn Care Unit in the countryside of the state of São Paulo☆

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Received 1 December 2013; accepted 16 February 2014

KEYWORDS
Burns/epidemiology;
External causes;
Child;
Adolescent

Abstract

Objective: To describe the profile of pediatric burn victims hospitalized at Hospital-Escola Padre Albino (HEPA), in Catanduva, São Paulo, Brazil.

Methods: This was a cross-sectional, retrospective study analyzing 446 medical records of patient aged 0-18 years old hospitalized in the Burn Care Unit of HEPA, from 2002 to 2012. The following variables were recorded: demographic data, skin burn causes, lesions characteristics, complications, surgical procedures, length of hospital stay, and outcome. Descriptive statistics were used.

Results: 382 patients with full medical records were included in the study. Burns were more frequent in males (64.4%) and in children aged less than 6 years (52.9%). Most accidents occurred at home (67.3%) and hot liquids were responsible for 47.1% of them. Mean burnt body surface was 18% and the most affected body areas were chest and limbs. First- and second-degree burns were observed in 64.4% of the cases. Secondary infection and surgical procedures occurred in 6.5% and 45.0% of the patients, respectively. Mean length of hospital stay was 9.8 days. The mortality rate was 1.6%.

Conclusions: Preschool children were the main victims of burns occurring at home, representing the largest contingent of hospitalizations due to this cause in individuals aged < 18 years. It is important to develop strategies to alert parents and general society through educational programs and preventive campaigns.

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DOI refers to: 10.1590/1984-0462201432305

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PALAVRAS-CHAVE
Queimaduras/epidemiologia;
Causas externas;
Criança;
Adolescente

Perfil de crianças e adolescentes internados em Unidade de Tratamento de Queimados do interior do estado de São Paulo

Resumo

Objetivo: Descrever o perfil de crianças e adolescentes vítimas de queimadura internados no Hospital-Escola Padre Albino (HEPA), em Catanduva (SP).
Métodos: Estudo transversal, retrospectivo, que revisou 446 prontuários de pacientes menores de 18 anos, internados na Unidade de Terapia de Queimados do HEPA, de 2002 a 2012. Foram anotados em fichas individuais: dados demográficos, agentes causadores da queimadura, características das lesões, complicações, intervenções cirúrgicas, tempo de internação e desfecho dos casos. A estatística foi descritiva.
Resultados: Foram incluídos no estudo 382 pacientes com prontuários completos. O sexo prevalente foi o masculino (64,4%), e a faixa etária predominante foi a de menores de 6 anos (52,9%). O domicílio foi o local de 67,3% dos acidentes, e 47,1% deles aconteceram com líquidos aquecidos. A média da superfície corpórea queimada foi 18%, e as regiões mais lesadas foram o tórax e os membros. Queimaduras de primeiro e segundo graus aconteceram em 64,4% dos casos. Infecção secundária ocorreu em 6,5% dos pacientes, e em 45%, procedimentos cirúrgicos. O tempo médio de internação foi 9,8 dias. A mortalidade foi de 1,6%.
Conclusões: A constatação de que as crianças em idade pré-escolar foram as principais vítimas das queimaduras originadas em domicílio, representando a maior parte do contingente de hospitalizações infantojuvenis por esta causa, demonstra a necessidade de desenvolver ações de sensibilização e orientação aos pais e à população em geral, por meio de programas educativos e campanhas de prevenção.
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Introduction

Burns are important causes of morbidity and mortality in the pediatric population; they can generate significant functional limitations and lead to social, economic, and emotional loss.[1,2] In Brazil, the statistics are inadequate, making it difficult to understand the magnitude of the problem and to identify the most affected populations and related circumstances.[3]

National registries indicate that in 2006, 16,573 children and adolescents younger than 15 years were hospitalized due to burn injuries, representing 14% of all hospitalizations for external causes in this age group.[4] In the same year, burns were responsible for 363 deaths in children younger than 15 years. In 2010, the number of hospitalized children and adolescents increased to 21,472, but the number of deaths decreased to 313.[5-7] These data show that, although advances in hospital care may contribute to the survival of patients who have suffered burn injuries, preventive measures are still needed to restrain this growing trend regarding the number of victims.[8]

The main causes of burns in the age group in question are accidental occurrences in the home environment, mainly scalding injuries or lesions caused by heated liquids. Among other risk situations, handling chemical or flammable products, accidents with pots on the stove whose handle is facing outwards, fireworks, electrical outlets, and handling bare wires and heated metal should be highlighted. The causative agent varies according to age; scalding baths predominate in those younger than 2 years. In preschool children, aged 2 to 7 years, flammable substances are the most prevalent cause, justified by the beginning of the exploring of the environment by the child and attraction to light sources. As in schoolchildren and adolescents, there is a predominance of burning by combustion. However, regardless of age, there are accidents caused by adults, albeit unintentionally.[8,9]

Considering that, throughout the country, prevention programs for this type of accident are scarce[8] and that the Burn Care Unit (BCU) of Hospital Escola Padre Albino (HEPA) is a regional referral center for the treatment of burns, the epidemiological design may represent an important tool not only to characterize the affected population, but also to define the circumstances in which these injuries occurred and thus helping prevent this type of accident. Given the relevance of the topic, this study aimed to describe the profile of pediatric burn victims hospitalized in the BCU/HEPA, in Catanduva, SP, Brazil, to compare the results with literature data, and to contribute to the development of prevention programs.

Method

This was a cross-sectional, retrospective study that reviewed the medical records of the Medical Records and Statistics Service (Serviço de Arquivo Médico e Estatística – SAME) and compiled data related to child and adolescent burn victims admitted to the Burn Care Unit of the Hospital Escola Padre Albino (BCU / HEPA) in Catanduva, from January of 2002 to December of 2012.

The study population consisted of 382 children and adolescents aged 0 to < 18 years, hospitalized with burns. Patient charts were reviewed by four of the researchers,

specially trained to fill in a previously tested standardized case report form, which included the following data on each patient: demographics, causative agents of burn injury, injuries characteristics, complications, surgical interventions, length of hospital stay, and outcome. The study excluded 64 of the 446 cases listed by the Center for Data Processing of HEPA whose medical records did not contain the following data: causative agent of burn, burned area, or extent and degree of injury.

The collected data were stored in a Microsoft Office Excel spreadsheet. Results were expressed as number, percentage, mean, and standard deviation (in case of burned body surface area [BBSA] and hospital length of stay), as well as median, applied exclusively to hospital length of stay. This study was approved by the Institutional Review Board /FIPA, CAAE n. 08018512.2.0000.5430.

Results

Between 2002 and 2012, 446 pediatric burn victims were hospitalized, of whom 382 (85.7%) had complete records and were included in this study. Of all participants, 246 (64.4%) were males and 136 (35.6%) females. The predominant age range was younger than 6 years, with 202 cases (52.9%), followed by the age range 6-12 years, 134 (35.1%). Adolescent patients were less common, with only 46 cases (12.1%). Regarding the origin of the patients, 90 (23.6%) were from Catanduva and 292 (76.4%) from the microregion consisting of 18 municipalities.

Most accidents (257 cases; 67.3%) occurred in the home environment. The remaining 125 cases (32.7%), mainly in the adolescent range, occurred in leisure or work environments. The causative agents of burns, the affected body region, complications during hospitalization, and surgical interventions are presented in Table 1, which shows that heated liquids were responsible for approximately half of the accidents, and that the most affected body surfaces were the chest and limbs.

The extent of BBSAs is detailed in Fig. 1. On average, BBSA was 18% ± 12%, and 305 patients (79.8%) had at most 29% of the body affected. Regarding the degree of burns, 246 cases (64.4%) had only first- and second-degree burns, while 136 (35.6%) also had third-degree burns.

The mean, standard deviation, and median length of hospital stay were 9.8 ± 6.8 and 8 days, respectively; the majority of patients (235; 61.5%) remained hospitalized for 1-9 days, and the minority (10; 2.6%) for 30-45 days. Hospitalization periods of 10-19 and 20-29 days were observed in 114 (29.9%) and 23 (6%) cases, respectively. Six patients (1.6%) died: two adolescents and four children, of whom 66.7% of them reported an alcohol accident history and had at least 60% of BBSA, with second- and third-degree injuries in the head, neck, thorax, and limbs, with no reference to secondary infection.

Discussion

Burns are among the main external causes of death recorded in Brazil, surpassed only by violent causes such as traffic accidents and homicides.[10] It is estimated that approximately 1,000,000 burn accidents occur annually in the country; of the total number of victims, only 100,000 to 200,000 will seek hospital care and, of those, nearly 2,500 will direct or indirectly die due to the burn injuries. However, national statistics on burn injuries are scarce, demonstrating a significant underreporting.[11,12]

Specialized literature on the subject reports that children comprise a group of differentiated patients, as they have a specific epidemiology when compared to adults, as well as specific physiology, immune, and inflammatory responses and, therefore, require special care regarding treatment and rehabilitation in order to resume social life.[13]

The results of the present study showed a prevalence of accidents among males (64.4%). A study conducted at a university hospital in Curitiba, PR, Brazil, from July of 2007 to February of 2008, with 107 patients younger than 12 years,[1] showed a similar prevalence of males (63.5%).

Table 1 Distribution of 382 children and adolescents admitted to Burn Care Unit of Hospital Escola Padre Albino, Catanduva, SP, Brazil from 2002 to 2012, according to the epidemiological and clinical aspects of burns

Variable	Classification	Number of patients	%
Burn agent	Abrasive/chemical	17	4.5
	Alcohol/gasoline	89	23.2
	Flame	42	11.0
	Electrical current	8	2.1
	Heated liquid	180	47.1
	Heated surface	46	12.1
Burned body region	Upper limbs	290	75.9
	Lower limbs	234	61.3
	Chest	148	38.7
	Head	111	29.1
	Neck	83	21.7
	Abdomen	46	12.0
	Genitals	9	2.4
Complications/ Surgical interventions	Secondary infection / sepsis	23	6.5
	Reconstitution/grafts	83	21.7
	Scarotomy/ debridement	84	22.0

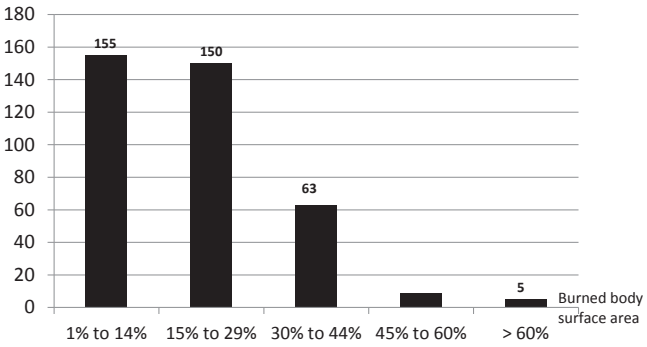

Figure 1 Distribution of children and adolescents hospitalizaed in Hospital Escola Padre Albino, Catanduva, SP, between 2002 and 2012, according to the extension of the burnt bodily area

Similarly, Martins and Andrade,[14] who analyzed 182 cases of pediatric burn victims younger than 15 years treated at five hospitals in Londrina, PR, Brazil, in 2001, observed similar frequency in males (56.6%). Almeida *et al*,[15] in a quantitative descriptive study of 20 burned children admitted to the Burn Treatment Center of an institute in Fortaleza, CE, Brazil, in the months of April and May of 2004, observed a predominance of females (65%). The findings of the latter study, with a different profile than the others, can be explained by its small sample size. The higher number of cases observed in males can be explained by higher occupational and domestic exposure,[16] the different gender behavior, and cultural factors, which results in greater freedom for men and more vigilance for women.[17]

Regarding the age group, the present study observed a higher number of cases in children younger than 6 years (52.9%). A similar prevalence in children younger than 4 years (57.6%) was described by Viana *et al*,[18] when analyzing medical records of 410 children aged 0 to 14 years admitted to the emergency room for burns in Goiânia, GO, Brazil, in the period of 2005 to 2007. A recent publication by Fernandes *et al*,[2] which included 289 children and adolescents with burn injuries admitted to a referral hospital in João Pessoa, PB, Brazil, from January of 2007 to December of 2009, showed that approximately 70% of the patients were younger than 7 years, which was also observed by Nigro *et al* in Paraná.[1] Factors that may explain the higher prevalence of accidents at this early stage of life are related to the characteristics of child development, as children are immature and curious regarding the environment, and are thus more exposed to dangerous situations, which is potentiated by inadequate monitoring.[14]

The HEPA is a referral hospital in the care of burned patients, located in the northwest region of the state of São Paulo, treating both adults and children with burn injuries. It has 14 beds, four of which have ICU characteristics, plus two rooms for burn wound dressings, equipped with a multiparameter monitor with noninvasive blood pressure, electrocardiogram and monochrome screen pulse oximetry, infusion pumps, cardioverter/defibrillator with pulse oximetry, microprocessor electronic ventilator, pneumatic compression systems for deep vein thrombosis prophylaxis, beds with weight monitoring, special tables for balneotherapy; and it is a workplace of a competent multidisciplinary team. Since it is a referral center, it receives patients from a micro-region comprising 18 municipalities, considering the large number of patients (76.4%) from the neighboring cities. A similar profile was observed in the city of Goiânia, where it was observed that 69.2% of the patients came from other cities and even other states.[18]

The research question about the accident site for participants in this study demonstrated a prevalence of home accidents (67.3%), which was also observed in other studies (85.5%[2] and 88.3%[18]). A well-known study in the area,[19] performed through interviews with legal representative for 537 children and adolescents admitted to a hospital in Minas Gerais in 1992, indicated similar rates of home accidents (74%), with 59% of them occurring in the kitchen. This increased number of accidents in the home environment is perfectly compatible with the period of life of these infants and preschool children. As they are not at school age yet, they remain confined to the family environment and often under the care of their siblings, who, albeit older, are still immature and not legally responsible.

Among the causative agents of burns, heated liquids accounted for approximately half (47.1%) of the etiological agents. Aragon *et al*[20] performed a retrospective study of 479 children admitted to the Burn Care Unit of Sergipe in the period of 2004-2006 and found a higher prevalence of this causative agent (71.6%), which was also observed by Martins and Andrade (82.4%).[14] This higher prevalence of the latter two studies may be explained by the sample characteristics, which included only patients younger than 12 and 15, respectively. Machado *et al*[21] performed a retrospective study of 2,961 cases of burn injuries in children younger than 15 years treated at the Burn Care Center (BCC) of Hospital Andaraí in Rio de Janeiro, Brazil, in the period from 1997 to 2007, and observed a prevalence of 49.5%, similar to the present study.

The second most common burn causative agent is alcohol or gasoline (23.2%). Serra *et al*,[22] in a study developed in the BCC of Hospital Andaraí, evaluated 51 adolescents aged 12 to 18 years in the period 2007-2011 and found a slightly higher prevalence of flammable liquids (33%), which may be a consequence of the age range, which comprises exclusively adolescents. Oliveira *et al*,[23] in a review of medical records of 56 children aged 0-12 years old admitted in 2010 to a BCU in Teresina, PI, Brazil, reported alcohol as the causative agent in only 11% of cases.

Another important cause of burns is represented by fire and the hot surfaces. Andretta *et al*[24] analyzed records of individuals aged 0 to 14 years admitted to the pediatric ward of a hospital in Tubarão, SC, Brazil, during a ten-year period (1998-2008) and observed that 37.8% of the accidents were caused by fire and contact with hot surfaces, similar to the research of Viana *et al* (32.2%),[18] and higher than what was found in the present study (23.1%). The less frequent causative agent in the present investigation was electricity, which caused 2.1% of the burns, similar to other publications (3.3%[14] and 5.4%[18]).

The analysis of results of the present study regarding skin lesions showed that, on average, total BBSA was 18 ± 12% (four-fifths of the participants had at most 29% of BBSA) and that the most affected regions were the chest and limbs. Dassie and Alves,[25] through the analysis of medical records of 145 children aged 0 to 12 years old admitted to a university hospital in Londrina, PR, Brazil, from August of 2007 to May of 2010, observed a predominance of burn injuries in the trunk (19.7%), upper limbs (17.6%), and head (15.3%); on average 15% of BBSA. Nigro *et al*[1] observed a BBSA of 20% ± 12%. Oliveira *et al*,[23] in turn, showed that 55% of the victims had up to 10% of BBSA; 29%, between 10% and 20%; and 16%, over 20%.

As for the burn degree, in the present study, almost two-thirds of the victims had only first- and second-degree burns, while the rest had third-degree burns. Other authors mentioned earlier showed similar results (59.3%,[20] 62.6%,[2] and 62%[17] of third-degree burns).

The research participants remained, on average, ten days at the hospital, and mortality rate was 1.6%. Secondary infection was detected in 6.5% of cases and the surgical procedures that assist in the re-epithelialization process,

such as debridement and grafting, common in more severe burns,[26] were required in approximately 45% of all hospitalized patients. Nigro *et al*[1] described similar results, with a mean hospital stay of 16 days, mortality of 0.9%, and the need for grafts in 28.3%. As for the study by Dassie and Alves,[25] although they reported the same mean length of hospital stay (16 days), they reported much higher rates of surgical procedures (84.8%) and mortality (4.8%). Other studies have observed even higher rates of mortality (5.8%[21] and 11.8%[22]).

In the present study, the exclusion criterion (incomplete medical records) sought to minimize one of the many limitations of a retrospective study, but it is noteworthy citing other study limitations: the lack of standardization of medical records; incomplete and/or illegible records; repeated and/or divergent records; notes written by specialists from different fields; difficulty in locating and accessing the records, among others. In addition, some basic data for burn case analysis, such as etiological agents responsible for secondary infection, quality and quantity of the solution used for volume replacement, and need for mechanical ventilation were not the variables included in this review, which may have affected the research scope.

Despite the abovementioned limitations, this study concluded that children of preschool age were the main victims of burn accidents occurring at home and represented the largest contingent of pediatric hospitalizations for this cause. The results, similar to those described in the literature, added to the epidemiological knowledge of the population treated at the BCU-HEPA in Catanduva and demonstrate the need to raise awareness and provide guidance to parents and the general public, through educational programs and prevention campaigns.

Not only the biopsychosocial losses resulting from burns in children and adolescents must be considered, but also the ethical aspects of the issue. The impact of this issue becomes more relevant because most burn accidents could be prevented and many lives could be saved, in addition to improvement of survivors' quality of life.[27,28] In this process, the family and the school, responsible for the formation of children and adolescents, should play an important role in promoting and preventing accidents among the pediatric population.[2]

Conflicts of interest

The authors declare no conflicts of interest.

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